INFORMATION PAPER

Military Vaccine Agency 24 February 2006

SUBJECT: Pertussis Infection and Pertussis Vaccines

1. Purpose: To describe pertussis and the vaccines to prevent it.

2. Facts.

a. Microbiology. Pertussis, better known as whooping cough, is an acute infectious disease caused by the bacterium *Bordetella pertussis*. The disease causes fits of violent coughing, frequently followed by an inspiratory whoop and vomiting. Outbreaks of pertussis were first described in the 16th century, and the organism was first isolated in 1906. In the 20th century, pertussis was one of the most common childhood diseases and a major cause of childhood death in the United States. Before pertussis vaccine was first licensed in the 1940s, more than 200,000 cases of pertussis were reported annually. Since widespread vaccinations began, incidence has decreased more than 98%, to an average of about 4,400 cases per year since 1980. Pertussis remains a major health problem among children in developing countries, with an estimated 285,000 deaths resulting from the disease worldwide in 2001.

b. Epidemiology. Pertussis is one of the most contagious diseases among human beings. The disease is spread when infected people cough or sneeze, expelling droplets that contain *Bordetella pertussis* bacteria. Older siblings or adults who may be harboring the bacteria in their nose and throat can infect an infant. Symptoms due to pertussis usually appear 5 to 10 days after exposure, but can take up to 21 days. The first symptoms are similar to those of a common cold (e.g., runny nose, sneezing, low-grade fever, mild cough). The cough gradually becomes severe and, after 1 to 2 weeks, the patient has spasmodic bursts of numerous, rapid coughs. The characteristic high-pitched “whooping” comes from breathing in after a coughing episode. During such an attack, the patient my turn blue, vomit, and become exhausted. Coughing attacks occur more frequently at night. The attacks increase in frequency for several weeks, plateau for 1 to 2 weeks, and then gradually decrease. Coughing may last as long as 10 weeks.

c. Vaccine. Primary immunization against pertussis is provided in combination with diphtheria and tetanus toxoids (DTaP) administered in childhood. Vaccine efficacy ranges from 80% to 85% for vaccines currently licensed in the United States. When studied, the current acellular pertussis vaccine (aP) was significantly more effective than the original whole-cell pertussus vaccine. Increases in pertussis infections in adolescents and adults (probably due to waning immunity following primary immunization) resulted in recent licensing of Tdap (tetanus toxoid, reduced dose diphtheria and acellular pertussis vaccine) for immunizing adolescents and adults after completion of primary immunization with DTP/DTaP.

d. Immunization.

1. Children: The primary DTaP vaccinating series consists of four doses, the first three doses given at 4- to 8-week intervals, beginning at 6 weeks to 2 months of age. The standard schedule is 2, 4, and 6 months of age, followed by a fourth dose given 6 to 12 months after the third dose, to maintain adequate immunity for the ensuing preschool years. Inject DTaP simultaneously with other indicated vaccines.

2. Adolescents: Administer a single dose of Tdap to 11 to 18 years old should receive one dose of Tdap instead of Td for booster immunization if they have completed the recommended childhood DTP/DTaP immunization series and have not received Td or Tdap. The preferred age for Tdap immunization is at 11 to 12 years of age to reduce the morbidity associated with pertussis in adolescents. For adolescents ages 11 to 18 years old who received Td, but not Tdap, are encouraged to receive a single dose of Tdap if they completed their childhood DTP/DTaP immunizations. An interval of 5 years between Td and Tdap is recommended to reduce the risk for local and systemic reactions after Tdap.

3. Adults: Administer a single dose of Tdap to replace a single dose of Td for booster immunization in adults who received their most recent tetanus-toxoid containing vaccine ≥ 10 years earlier. Tdap may be given at an interval as short as 2 years following most recent tetanus-toxoid containing immunization to protect against pertussis.

e. Cautions. The following people should not receive pertussis vaccine: people who had serious allergic reactions to previous pertussis immunization, people with severe allergy to any vaccine component; and people who developed encephalopathy within 7 days after pertussis vaccination not due to another identifiable cause.

f. Adverse Events. Local reactions (e.g., erythema, tenderness) are common after the administration of vaccines containing diphtheria, tetanus, or pertussis antigens. Occasionally, a nodule may be felt at the injection site. Mild systemic reactions such as fever, drowsiness, fretfulness, or loss of appetite occur frequently and can be managed with symptomatic treatment. Moderate-to-severe systemic events, although rare, include high fever (i.e., > 105^{o}F) and associated temporary febrile seizures.

g. DoD Policy. DoD policy for DTaP and Tdap vaccines is to follow ACIP guidelines.

3. References.

a. Advisory Committee on Immunization Practices. Preventing tetanus, diphtheria, and pertussis among adolescents: Use of tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccines. MMWR 2006;55:1-43

b. CDC disease information. www.cdc.gov/doc.do/id/0900f3ec80228696

c. Multiple resources (e.g., product insert, Vaccine Information Statements) assembled by Military Vaccine Agency: www.vaccines.mil/pertussis

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